

MAY 10 2001

191 Cascabel  
Los Alamos, N M 87544  
May 6, 2001

Dr. Joshua Lederberg, Rockefeller University

Dear Dr. Lederberg:

The enclosed essay about biological warfare is in the current issue of *The World & I* magazine published by the Washington Times. It was written for the general reader in order to increase public awareness of the rapidly changing challenges that are occurring in the area of biological threats. The viewpoints expressed in the essay differ significantly from the current emphasis of most of our governmental and military authorities. In particular, the essay emphasizes the consequences of recent advances in microbial genomics and posits a general paradigm shift that greatly increases the difficulty of bio-threat reduction. Almost daily, evidence is accumulating that genetically modified pathogens can be created with enhanced virulence, infectivity, transmissibility and that are refractory to treatment and can render vaccines ineffective. Almost all of the materials, methodologies and databases are publically available. One can therefore expect shifts in the biowarfare business: a shift from stockpiled, weaponized natural pathogens produced by large expensive organizations, to the polyfocal dissemination by contagion of genetically enhanced pathogens, created by small, hard to detect, relatively inexpensive teams. Treaties and national borders will become irrelevant and the motives of numerous potential adversaries will become diverse and/or obscure.

The fatalistic tone of the essay is related to three considerations. First, most if not all of the advantages in a biological war favor a skillful adversary. Second, getting serious attention applied to this challenge is difficult. As Joshua Lederberg has pointed out, as far as biological warfare is concerned, "We haven't had our 'Hiroshima' yet." Finally, the public health infrastructure of both the United States and much of the world has suffered shocking decay in recent years. Correcting this last issue appears to be a *sine qua non* of any realistic response to this problem. I would appreciate receiving any comments you would like to make about this letter or the essay.

Sincerely,



Paul Kraemer, Ph.D., Dr. P.H.  
kraemer@telomere.lanl.gov